

Method of Temperature Measurements for Fragment of Microobject

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Abstract - The method of temperature measurements for fragment of microobject with use of the induced photoluminescence functional nanoparticles, as temperature sensor controls is developed.

Key words - Luminescent microscopy, thermosensor, Peltie's elements, thermal pipes, Duar's vessels.

I. INTRODUCTION

The problem of temperature measurement for fragment of microobject at its research by a scanning optical microscope can be resolved by means of thermosensitive sensor controls. Sensor controls settle down on a surface of microobject or in the middle of it. To these requirements answer nanoparticles of an organic or anorganic origin in a liquid or firm condition in proportional environments [1]. Besides, thermosensitivity of such sensor controls should be shown in characteristics which can be read out from sensor controls on a distance. Thermosensitive property of a sensor control should be the induced photoluminescence. Parameters of radiation of the induced photoluminescence (spectrum, intensity, duration of afterglow) bear the temperature information of a fragment.

III. METHOD OF TEMPERATURE MEASUREMENTS

Among parameters of the induced photoluminescence the optimal from the point of view of metrology is duration afterglow. Temperature dependence of duration of afterglow luminescent components nanoparticles is defined only by a chemical compound of its substance [2].

To measure duration of afterglow expediently by a method of phase shift [3]. In this method a curve of duration afterglow it is not registered, however obtained information can be used for calculation of duration of afterglow of attenuation of a luminescence.

The light source and phase-sensitive system of registration are necessary for realization of a method of phase shift. Modulation of light is reached by the modulation of a voltage enclosed to a source, or passage of a constant light stream through the device with changing optical absorption. The phase-sensitive system of registration uses a principle of synchronous detecting [4], which allows allocating weak signals on a background of significant noise.

For calibration of thermosensitive sensor controls it is expedient to use a cooler of preparations on the basis of elements Peltie's thermal pipes and Duar's vessels [5].

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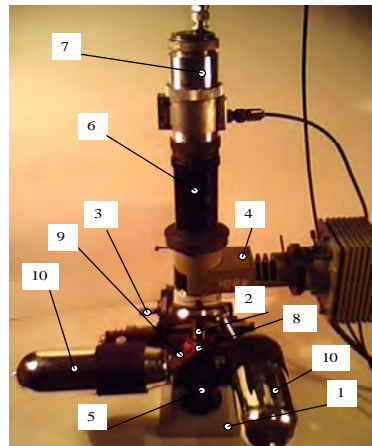


Fig. 1 Breadboard model of an optical microscope for research of dependence of duration of afterglow of a luminescence thermosensor controls from temperature (1 - microscope "Биолам С11", 2 - objective, 3 - mechanism of moving by object, 4 - luminescent gaffer "ОИ-28" (the modulator of a light stream is not specified), 5 - PM of irradiations, 6 - PM of luminescence, 7 - divider PM, 8 - refrigerator, 9 - thermal pipe, 10 - Duar's vessels

III. CONCLUSION

The method of temperature measurement with use of the induced photoluminescence functional nanoparticles as temperature sensor controls is developed.

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